

ABSTRACT OF THE DISCLOSURE

A threshold matrix (a mask) that enables obtaining high-quality images each with a uniform dot distribution using  
5 a small or substantially small mask and enables to obviate the need to increase the mask size for high-definition printers and to reduce the memory capacity required to store the mask, as well as a gray-level reproduction method and apparatus using this threshold matrix is described.

10 A threshold matrix is formed so that (1) a dot pattern generated by executing a gray level reproducing process using the threshold matrix has at least a set of element pixel blocks having in all gray levels the same dot distribution in each element pixel block corresponding to each element mask, (2) weak  
15 irregularity or pseudo periodicity is introduced into one of the low gray levels equal to or higher than the first gray level, (3) in all gray levels, the number of dots is equal for all element pixel blocks, and (4) in every  $4n$  ( $n$  is an integer) gray levels, the number of dots is equal in four individual partial  
20 element pixel blocks each obtained by quartering each element pixel block.